1235

SANYO

Portable AC/DC Tape Recorder

MODEL MR-110

SERVICE MANUAL

SANYO ELECTRIC CO., LTD.
INTERNATIONAL DIVISION : SANYO ELECTRIC TRADING CO., LTD.
OSAKA, JAPAN

SPECIFICATIONS

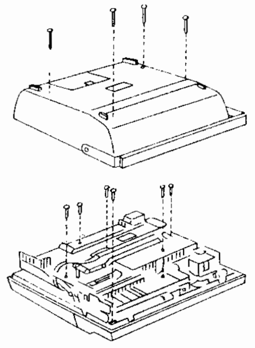
'ansistor complements	2SB303C	Ist amplification stage
	2SB186	2nd amplification stage
	2SB186	3rd amplification stage
	2SB186	4th amplification stage
	2SB272×2	Output stage
	2SB187	Oscillator for recording bias
	2SB217	Voltage regulator
Other elements used	1S188×2 (Diode)	For level meter & Automatic level control
	SDT-06×1 (Thermistor)	For temperature compensation
	SV-30×2 (Diode)	Automatic level control
	RD-9A×1 (Zener diode)	
Recording system	AC biasing, double track	
Erasng system	DC erasing	

Undistored, maximum output power	Undistorted 0.8W Maximum 1 W
Power requirement	9-volt DC (D-size flashlight battery×6) 110-117 & 220-240V, AC 50 & 60 c/s
Tape speed and Recording time(with 5 inches reel)	1-$\frac{7}{8}$ in (4.75cm)/sec 2 hours 3-$\frac{3}{4}$ in (9.5 cm)/sec 1 hour
Tape reel	Maximum 5 inches reel
Foward & Rewind time	Forward Up to 3 minutes Rewind Up to 2.5 minutes
Frequency response	100-7000 c/s at 3-$\frac{3}{4}$ in/sec 100-4000 c/s at 1-$\frac{7}{8}$ in/sec
Loudspeaker	2-$\frac{3}{4}$″×4-$\frac{1}{8}$″ permanent dynamic speaker Voice coil impedance 8 ohms
Signal-to-noise ratio	Over than 40 db.
Dimensions	11-$\frac{1}{2}$″ width×10-$\frac{1}{4}$″ depth×3-$\frac{5}{8}$″ height
Weight	8.6 lbs. (3.9kg) approx. (excl batteries)

DISASSEMBLY INSTRUCTIONS

To remove the amplifier and mechanism from the cabinet······

1. Rotate the pinch roller fixing screw in anti-clockwise direction and remove. Then pull the pinch roller upward and remove. Pull the head cover and take it out.
2. Invert the tape recorder and remove four (+) screws by rotating them anti-clockwise. Then remove the back lid.
3. Remove all 6 (+) screws coated with red paint by turning them anti-clockwise.
4. The amplifier and mechanism can now be taken out of the cabinet.



HOW TO ADJUST THE MECHANISM

When the tape recorder fails to respond to the movement of controls; such as insufficient functioning of rewinding or forwarding, slackening of recording tape when the control is moved from 'stop' to 'playback', or excessive tension is applied to tape at every function······make the following adjustments.

Tools & Gauges Required

To make the adjustment of mechanism practically no tools are needed. However, in order to ascertain the accuracy of mechanism as to whether it is operating as originally designed the following gauges are to be used:

Type of Gauges	Extent of Measurement (Coverage)
Tester	DC 10V, DC 300mA Range.
Tension Gauge	0—300 gr. 0—100 gr. 0—1 Kg. 0—3 Kg.

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“Stop” Position

(1) **Adjustment of Brake Mechanism**

When the control is moved to “stop” from recording, playback, or rapid winding, the brake is applied weakly to takeup reel base and strongly to supply reel base.

When the control is moved to “stop” from rewinding, the brake is applied strongly to takeup reel and weakly to supply reel. In the event the strength of brake pressure works in reverse, it will cause slackening of recording tape when the control is moved to “stop”. Figure 1 shows the position of mechanism when the brake is applied.

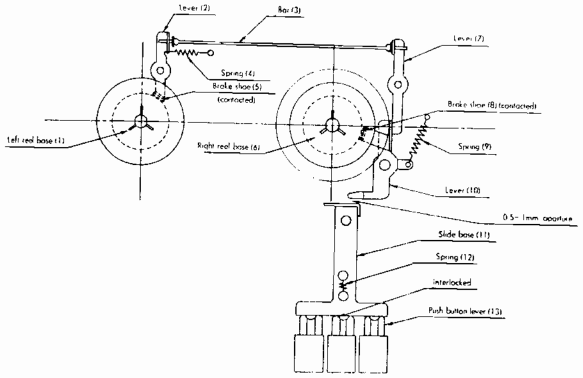

Lever (2)
Bar (3)
Lever (7)
Spring (4)
Brake shoe (5) (contacted)
Brake shoe (8) (contacted)
Left reel base (1)
Right reel base (6)
Spring (9)
Lever (10)
0.5~1mm aperture
Slide base (11)
Spring (12)
interlocked
Push button lever (13)

fig. 1

1. The slide base (11) must be in contact with push button levers (13) for rapid winding and rewinding. In case there is an aperture between the slide base and push button levers, adjust spring (12).
2. There should be an opening of 1-2mm between lever (I0) and slide base (11). If there is no aperture between the lever and slide base, either the brake shoe is worn out or it has come off. Check and replace. The brake shoe (8) is composed of hard pressed felt and it is designed to give satisfactory performance even when it is worn down to 0.5mm.

   Note: Adjustment of brake on the takeup reel base side is done by spring (9). This adjustment should be done only after checking the points mentioned under 1 and 2.
3. There should be an opening of 1-2mm between lever (10) and lever (7).
4. When the brake fails to apply properly if the rewinding reel base is turned anti-clockwise, spring (4) must be adjusted.

   Note: Since the brake on the rewinding or supply reel base is closely related with takeup reel side's brake, check the points mentioned under 1 and 2 also.

(2) **Adjustment of Pinch Roller Position**

At ‘stop’ position, the pinch roller lever should be as shown in figure 2, Since the movement of this pinch roller lever (14) has much influence on the opening angle of pad, utmost caution should be paid in making adjustment. To adjust, control the adjusting nut (15).

Adjust the length of functioning bar (17) which links playback button lever (16) and pinch roller lever (14). After making the adjustment, remove the capstan sleeve, so that the tape speed will become 4.75 cm/sec., and press the playback button. There must be an aperture of 0.5-1mm between pinch roller lever (14) and adjusting nut (15) at this time.

To control the pressure of pinch roller, adjust spring (18). For adjustment of pinch roller, refer the following paragraphs.

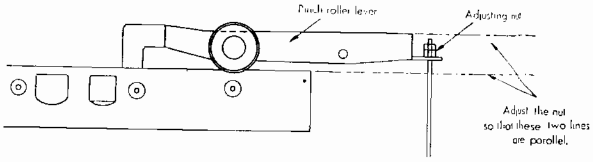
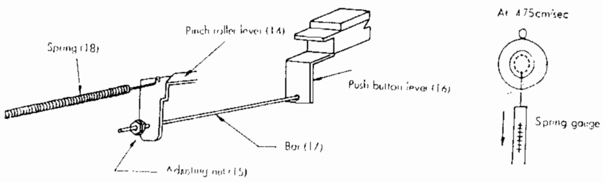

Pinch roller lever
Adjusting nut
Adjust the nut so that these two lines are parallel.

fig. 2


Spring (18)
Pinch roller lever (14)
Push button lever (16)
Bar (17)
Adjusting nut (15)
At 4.75cm/sec
Spring gauge

In Normal Forwarding

In normal forwarding, it is most important that the recording tape is transported at precise speed without slipping. To insure this, the tape recorder is pre-adjusted. In case of trouble, refer the following:

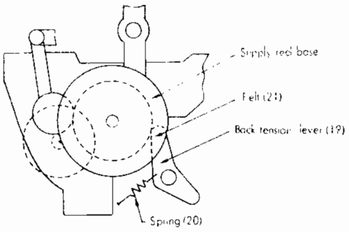
(1) **Adjustment of pressure of Pinch roller**

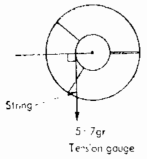
The cause of slipping of the recording tape between the capstan and the pinch roller may be traced to weak pressure of the pinch roller.

The presure of the pinch roller should be 350±50g at 4.75 cm/sec. To determine the pressure, use spring gauge and pull the pinch roller shaft, and gauge the pressure of the pinch roller when it stops to rotate. In making this check, do not load the recording tape.

(2) **Adjustment of back tension**

To prevent wobbling or slackening of recording tape at normal forwarding, tension is applied to the recording tape by applying slight brake to the supply reel base. This is done by back tention lever (19), and adjustment is made by spring (20).

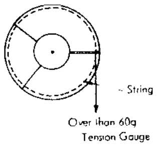

Supply reel base
Felt (21)
Back tension lever (19)
Spring (20)


String
5~7gr
Tension gauge

*Put the mechanism in FWD, place the reel on the left side spindle and measure the end of thread with tension gauge by pulling in the direction of arrow. The strength at the instant when the reel rotates in anti-clockwise direction is determined as back tension.

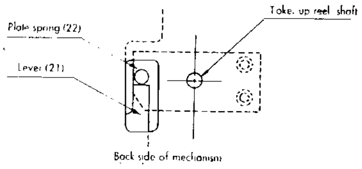
(3) Adjustment of winding torque

In normal forwarding, (especially when the recorder unit is in upright or suspended position) and when the recording tape slackens or when the recording tape on takeup reel is loosely wound, adjustment of the following tension is necessary:



As shown in the illustraion, loaded reel is placed on the spindle and the mechanism is put into FWD. Using tension gauge, the reel is pulled in the direction of arrow, and the strength at the instant when the reel rotates in anti-clockwise direction is determined.

Bend Lever (21) to make the adjustment. After adjustment, make sure this lever and leaf spring does not contact.

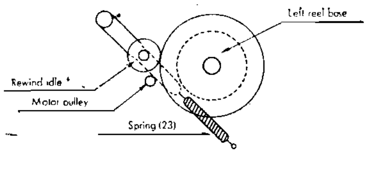


In Rapid Fowarding (Winding)

In rapid winding, the entire length of recording tape must be transported at fast speed. To adjust the strength, the method is exactly the same as in the case of Normal Forwarding Para. (3) "Adjustment of winding torque". The reading of strength must be identical.

In Rewinding

In rewinding, as in the instance of rapid winding, the entire length of recording tape must be transported. At times, the spring (23) may be weak, or eyelet part (24) may be tight. Examine these points, and rewind the tape which has already been rewound. If the machine functions, the adjustmeut is complete.



Push buttons

The push buttons require the following pressure to function:

Srength needed to push Stop Button…………2.2 kg/ or less
〃 Rewind 〃 …………2.2 kg/ 〃
〃 Rapid winding 〃 …………2.2 kg/ 〃
〃 Playback 〃 …………2.2 kg/ 〃
〃 Recording 〃 …………2.2 kg/ 〃

When the pressure needed differs excessively from the above figures, the mechanism requires adjustment or repair. Press the button and see where the friction is. Then smoothen the surface and apply grease.

In additton, when peculiar noise or sound is produced by mechanism, adjustment or repair is necessary.

Supply Reel Base (Spindle)

At stand still, the supply reel base must not move more than 0.2 — 0.4 mm in vertical direction. Adjustment is done by changing the thickness of nylon wahser at the upper part of the reel base.

Pinch Roller

The pinch roller must not move more than 0,5 mm in vertical direction.

STORAGE

After using the tape recorder, make sure all the push buttons are in raised "stop" position, then close the lid.

To store the tape recorder for an extended period, take out the batteries. When kept too long, the butteries may leak and damage the mechanism.

LUBRICATION

This tape recorder requires little oiling, and besides, rotating shafts are equipped with oil reservoir device.

Do not put too much oil as excess oil may flow or rise on the shafts and adhere to belt or pinch roller or other rubber parts and cause slipping.

ADJUSTMENT & PERFORMANCE OF ELECTRICAL PARTS

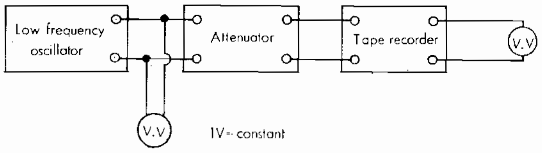
(1) Measuring Instruments

In order to test and adjust electrical parts, the following instruments are required:

1. Tester
2. Vacuum Tube Voltage Meter
3. Low Frequency Oscillator
4. Attenuator
5. Oscilloscope
6. Standard Recording Tape

(2) Adjustment of Standard Recording Level

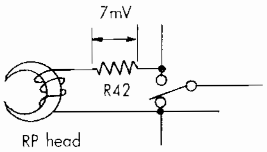
Arrangement of Tape Recorder. (Switch position "REC", Volume Maximum)



Power Input: Adjust the semi-fixed VR$_1$ (5 KΩ) so that the VU meter will register 0 db at the Microphone Input terminal at—71 db.

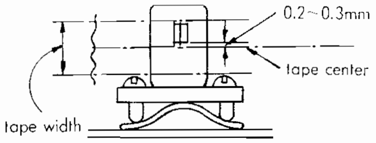
(3) Oscillation Bias Current

Bias current during the recording is measured at both ends of R42. Adjustment is made by semi-fixed VR$_3$ so that the voltage will register 7mV.



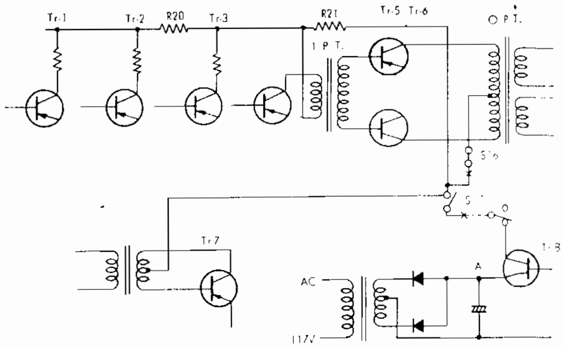
(4) Adjustment of Head Angle (9.5 cm/sec. at Playback)

Use standard recording tape of 5000 c/s and adjust the screw for angle adjustment so that the power output will reach maximum.



(5) Indication of Power Voltage. (Battery Voltage Indication) Connect 6.5 V power to battery terminals, put the machine in "PLAY" position. When VR MIN. adjust the semi-fixed VR$_4$ (50K) so that the indicator will point to the same position as OVU.

(6) Voltage and Current Value of each part.
Gain Distribution and Frenquency Response of each stage.



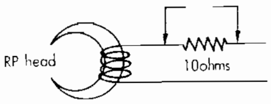
1. Voltage value of each part.

Gauged point	Play-back	Recor-ding	Tester range
A(v)	15.7	14.5	25
B(v)	6.8	6.5	25
C(v)	6.0	5.7	25
Tr-8,E(v)	8.8	8.3	25
Tr-7,C(v)	/	8.0	25
Tr-4,C(v)	7.0	6.8	25
Tr-3,C(v)	5.4	5.0	25
Tr-2,C(v)	2.3	2.4	10
Tr-1,C(v)	2.1	2.3	10
Tr-7,C(v)	/	1.0	10
Tr-4,e(v)	2.0	1.9	10
Tr-3,e(v)	1.8	1.7	10
Tr-2,e(v)	1.5	1.5	10
Tr-1,e(v)	2.0	2.0	10

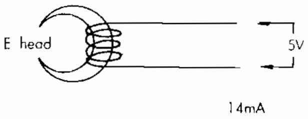
2. Current value of each part.

Gauged point	Play-back	Recor-ding	Test range
A (mA)	165	8.0	100
B (mA)	75	7.2	25
Tr-1'e (μA)	460	380	1
Tr-2,e (μA)	410	370	1
Tr-3,e (μA)	560	740	1
Tr-4,e (mA)	2.2	2.1	1
Tr-7,e (mA)	/	42.5	100

3. Recording bias Current.



4. Erasing Current.



5. Gain Distribution and Frequency Response of each stage.

	c/s	Tr-1 (c) mv	Tr-2 (c) mv	Tr-3 (c) mv	Tr-4 (c) v	OPT 2 v	OPT 3 v	10Ω mv	
Playback	100	5.0	49.0	17.0	1800	1.7	/	/	Input level —70db
	I K	1.5	11.5	1.5	500	0.5	/	/	
	7 K	1.3	9.5	2.4	245	0.3	/	/	
Recording	100	1.05	2.10	2.3	205	/	16.0	0.4	Input level —70db
	1 K	1.1	2.15	0.5	105	/	18.0	0.45	
	7 K	1.0	2.15	4.3	400	/	23.0	1.9	

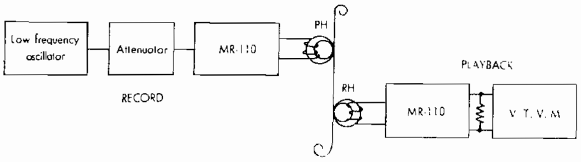
(7) Overall Frequency

Gauged Frequency / Tape Speed	200 c/s	1000 c/s	300 c/s	5000 c/s
9.5cm/sec	+1.5~−3	0db		+4~−5
4.75cm/sec	+6~−2	0db	+4~−6	

(Recording) Power Input Terminal: MIC Power Input Level —86db. VR Maximum

(Playback) Terminal to gauge : EXT SP (Connect dummy resistor) VR Maximum (8)

Diagram showing the connection



(8) Maximum Output 65 mW/over
(Recording) Power Input Terminal: MIC Power Input Level −70db 1000 c/s 9.5cm/sec.
(Playback) Terminal to gauge: EXT SP (Connect dumny resistor) VR Maximum

(9) Undistorted Output AC 117V - 650 mW/over
DC 9V - 760 mW/over
(Recording) Power Input Terminal: MIC Power Input Level −71db 1000c/s 9.5 cm/sec.
(Playback) Terminal to gauge: EXT SP(Connect 8Ω dummy resistor) Control VR to 10% distortion rating.

(10) Distorting Rating Less than 6%
(Recording) Power Input Terminal: MIC Power Input Level −71 db 1000 c/s 9.5 cm/sec.
(Playback) Terminal to gauge: EXT SP (Connect 8Ω dummy resistor) Control VR so that it will be 10 db lower than maximum output.

(11) S/N Rating 32 db/over.
(Recording) Power Input Terminal: MIC Power Input Level −71 db 1000 c/s 9.5 cm/sec.
(Playback) Terminal to gauge: EXT SP (Connect 8Ω dummy resistor) Control VR so that it will be 10 db lower than maximum output.

(12) Erasing Rating 60 db/over
(Recording) power Input Terminal: MIC power Input Level −61 db 1000c/s 9.5 cm/sec.
(Playback) Terminal to gauge: EXT SP (Connect 8Ω dummy resistor) Control VR so that it will be 10 db lower than maximum output.

(13) Cross Talk 60 db/over
(Recording) Power Input Terminal MIC Power Input Level −61 db 1000 c/s 9.5 cm/sec.
(Playback) Terminal to gauge: EXT SP (Connect 8Ω dummy resistor) Control VR so that it will be 10 db lower than maximum output.

(14) Current Consumption
Standard Voltage AC 117V
DC 8V } VR minimum
In case of AC 40– 70 mA
In case of DC 90–280 mA

(15) Hum Level Noise Level Below 30 mV (VR MAX)
Below 5 mV (VR MIN)
Terminal to gauge: EXT SP (connect dummy registor), recording tape not used.

SUGGESTIONS FOR MECHANICAL TROUBLE

Trouble	Cause	Repair
Capstan fails to rotate	*Defect of motor 1. Open in motor coil or defective contact of carbon brush.	1. Replace. *If capstan turns in Rapid Winding, or Rewinding, but fails in Recording or Playback, the cause is the defecitive contact of Governer. Terminal resistance of normally operating Governer at both ends should be 0 ohm.
	2. Burnt metal bearing.	2. Replace.
	*Defect of Transmission mechanism. 3. Skidding of motor pulley.	3. Tighten the screw.
	4. Oil on flat belt rubber.	4. Clean. *Wipe with alcohol or Carbon Tetra Chloride.
	5. Lack of oil on capstan shaft.	5. Lubricate between oilless matel and shaft.
	6. Defective flat belt.	6. Replace.

Trouble	Cause	Repair
Slow rotation	*Defect of motor	
	7. Burnt metal bearing	7. Replace or lubricate.
	*Defect of Transmisstion mechanism.	
	8. (Same. as 3–5)	
	9. Lack of oil in Takeup reel idler	9. Lubricate.
	10. Lack of oil in Takeup reel pulley	10. Lubricate.
Presence of wow and flutter	*Defect of Motor	
	11. Defective function of Governer.	11. Lubricate or Replace.
	*Defect of transmission mechanism	
	12. (Same as 3–10)	
	13. Alien objects on flywheel rubber.	13. Clean. (Same as 4)
	14. Deteriorastion of flywheel rubber.	14. Replace.
	*Defective movement of recording tape.	
	15. Defective back tension on Rewinding Reel.	15. Replace.
	16. Defective pressure of Pinch Roller.	16. Adjust Pinch Lever Spring.
	17. Change of quality or shape of Pinch Roller.	17. Replace.
	18. Adherence of dust on points contacting recording tape.	18. Clean. (Wipe with Carbon Tetra Chloride.)
Unsatisfactory winding.	*Reel Base does not rotate even when the tape is not mounted.	
	19. Broken belt or change of quality.	19. Replace belt.
	20. Weak transmission of Winding Idler & Winding Reel Pulley.	20. Adjust Winding Idler Spring.
	21. (Same as 1-10,16, & 19).	
	*Reel base does not rotate when the tape is mounted.	
	22. Weak pressure of Rapid Forwarding Roller, Reel Base & Reel Base Pulley.	22. Adjust Rapid Winding Roller Spring.
	23. Lack of oil on Reel Base.	23. Lubricate
Unsatisfactory rewinding.	*Reel base does not rotate either with or without reel or tape.	
	24. Weak transmission between Winding Idler & Rewinding Idler.	24. Adjust Rewinding Function Disc B.
	25. (Same as 1-10, 16, 19-21).	
Brake does not function	*Defect of Brake	
	26. Peeled brake shoe.	26. Use adhesive.
	27. Brake shoe touching Winding Reel Base Pulley.	27. Adjust the size of Brake shoe. *In case of Right Reel.
	28. Defective adjustment.	28. Adjust spring. *In case of Left Reel Brake, adjust Brake Function Disc D.
	29. (Same as 29).	
Unable to record.	*Switch fails to function the recording circuit.	
	30. Defective joint of RP Slide Lever B and C.	30. Tighten screw. *In adjusting the screw, press Rec. Button, and adjust the position of switch with over stroke so that RP Slide Switch will become Recording position.

Trouble	Cause	Repair
Unable to erasing	31. Weak pressure of Head Pad.	31. Adjust *Loosen the Pad fastening screw, and bring the pad forward or move the head front, or replace felt with thicker one.
Uneven winding of tape.	*During Recording or Playback 32. Reel shaft is not perpendicular to operating panel.	32. Replace. *Replacement is extremely difficult as Reel shaft is fastened tight onto chassis.
	33. Weak Takeup Reel Base Pulley Spring.	33. Adjust spring.
	34. Pressure difference at top & bottom of Pinch Roller & Capstan.	34. Replace Pinch Lever, or adjust.

SUGGESTIONS FOR ELECTRICAL TROUBLE

Trouble	Cause	Repair
*Even when the button is pressed······ *Motor fails to rotate and indicator needle does not move.	1. In case of AC: *Blown or loose fuse. *Bad or inadequate connection of power cord, plug. *Broken line in transformer, primary and secondary. *Short circuit in C27, bad silicon rectifier. *TR–8 bad. *Inadequate contact of S21	Check,. Replace or Repair.
	2. In case of DC: *Batteries drained, and inadequate contacts or connections.	Check voltage, replace.
	3. Both AC and DC: *Inadequate connection of S.17, S20.	Check, adjust or replace
*Motor rotates but indicator needle fails to rise.	4. Both AC and DC: *Indicator malfunctioning.	Replace.
	*Malfunction of semi-fixed VR 50KΩ in amplifier. (When needle does not rise as expected.)	Replace. (Adjust)
*Indicator needle rises but motor fails to rotate	5. *Bad motor or broken line.	Check.
	*Bad remote control jack or foot control switch jack.	
	*Bad S18, bad motor wiring.	Check.
*Motor fails to pick up speed in rewinding and rapid winding.	*S18 does not turn on.	Adjust.
	*Specified voltage does not reach the motor.	Check voltage & ampere of power source.
*Low voltage of power source on amplfier side.	AC–DC 6. Short circuit in negative side.	Check each part of amplifier and motor.
	AC 7. Bad of power transformer, levelling condenser (C27).	Check voltage & induction.
	8. Bad of diode rectifier.	
*High Voltage of power source on amplifier side. AC	*Short circuit of primary side LP of PT	Check, replace.

Trouble	Cause	Repair
*Cannot record or playback.	*Bad of amplifier (incl. Power output transformer).	Check voltage of each part, repair.
	*Bad of recording/playback head, sealed lead wire connection. (Bad R42).	
	*Inadequate contact of tape and recording/playback head.	
	*Inadequate function or contact of S1b.	
	*Insufficient contact of RP switch.	
*Can playback but cannot record.	*RP switch does not function or bad contact.	Check mechanism of switch.
	*Bad microphone jack or input jack.	
Indicator works	*Bad electrical circuit. (R22, C10, R21)	Check each element and wiring.
	*Bad of bias oscillotion circuit. (Especially R45, C26)	
	*Broken wire in OPT 3rd stage coil.	
Erasing insufficient	*Broken wiring of erasing head or R43	Check, repair.
*Can record but cannot playback.	*Bad RP switch, or bad contact.	Check mechanism of switch.
	*Bad speaker or its wiring broken.	Connect earphone to EXT SP jack and check.
	*Insufficient contact of EXT SP jack.	Repair, replace.
	*Broken wiring or short circuit of power output transformer.	Check indicator to see if needle swings in recording.
*Statics & Noises.	*Bad contact of VR.	Check, replace.
	*Bad of transistor. (Particularly TR-1)	Check, replace.
	*Deterioration of circuit element, contact with adjacent element, insufficient soldering,	Check.
	*Magnetized RP head.	Check, erase magnetism.
	*Distortion of bias oscillation wave.	Check and adjust circuit element.
*Increased noise in recording with microphone.	*Inadequate grounding of printed circuit plate.	Check, repair.
	*Bad microphone.	Check, replace.
	*Insufficient insulation of C2.	Check, replace.
	*Insufficient capacity of filter circuit (C1, C8, C16)	Check, replace.
*Inferior tone quality	*Bad of circuit element or transistors.	Check voltage & ampere of each part.
	*Inadequate AC bias.	Check bias current.
	*Inadequate contact of tape head.	Check loading of tape, contact points and clean.
	*Worn down RP head.	Check, replace.
	*Bad microphone.	Check, replace.
	*Bad speaker.	Check, replace.
*Insufficient high tones	*Inadequate RP head angle adjustment.	Adjust so that RP head slit is perpendicular to tape.
	*Inadequate value of AC bias value.	Check, adjust.
	*Capacity of C28, R14, VR1, C18, C19 too large, and resistance value insufficient.	Check, adjust.
	*Lack of capacity of C10.	Check, adjust.
	*Lack of pressure of RP Head pad.	Check, repair.
*Tones too high.	*Lack of capacity of C4, C7, C15, C17.	Check, repair.
	*Broken wiring of tone circuit, R14, VR1, C29; C36.	
*Cannot erase.	*Inadequate position of erasing head.	Adjust position.
	*Insufficient contact of erasing head and tape.	Clean.
	*Lack of erasing current.	Check DC erasing current.
	*Broken wiring or short circuit of erasing head.	Check, replace.
*Mixing of recorded materials of tracks 1 and 2.	*Inadequate position of tape guide, or vertical movement of tape that tilts the head.	Adjust tape guide or height of head.
	*Inadequate positioning of head for upper and lower tracks.	
*Lack of volume.	*Deterioration of transistors or circuit elements.	Check voltage & ampere of each part.
	Short circuit, broken wiring or insufficient soldering of circuit elements. (Especially emitter circuit, pass condenser bad)	Check, repair or replace.
	*Bad bias oscillation circuit.	Check, repair or replace.
	*Bad head, microphone or speaker.	Check repair or repalce,

PARTS LIST

CABINET

ILLUST No.	STOCK No.	DESCRIPTION	Q'ty
Cabinet Parts			
	*R–31615	Cabinet	1
	*R–261265	Specification board	1
	*	Net	2
	*	Net	5
	**R–31615	┬Panel	1
	**R–24954	├Insert nut	1
	**R–24955	├Insert nut	4
	**R–24956	├Insert nut	1
	**R–24732	└Insert nut	2
	**R–261266	Base	1
	**R–32550	Cover	1
	**R–12261	Plate spring	2
	**R–31618	Cover	1
	**R–261267	Badge	1
	**	Speaker net	1
	*R–31617	Lid	1
	*R–S81048	┬Hinge complete	2
	*R–12262	├Bar	2
	*R–12263	├Hinge metal	2
	*R–12264	└Hinge metal	2
	*R–32477	Cover	1
	*R–32498	Mounting metal	2
	*R–32476	Lid–for battery case	1
	*R–32501	Knob–for battery case	1
	*R–12260	Plate spring–for battery case	1
	*R–261277	Label–for voltage selection	1
	**R–261293	Indication board	1
	**R–44228	Cushion	1
	**R–44229	Cushion	4
	**	Net–panel	4
	*	Net–cabinet	2
	*	Net–cabinet	2

Note : *marks stand for the parts included in "Cabinet Complete,"
**marks stand for the parts included in "Upper Panel Complete."

ILLUST No.	STOCK No.	DESCRIPTION	Q'ty
	R–12106	Guide pin	2
	R–S81130	┬Handle complete	1
	R–112518	├Handle	1
	R–26181	└Cover	1
	R–24946	Special screw–for handle	2
	R–35240	Base–for handle	2
		Washer–for handle	2
	R–25145	Mounting metal	2
	R–32558	┬Head cover	1
	R–24969	└Tip	2
	R–35266	Screen–for ALC switch	1

CHASSIS

ILLUST No.	STOCK No.	DESCRIPTION	Q'ty
Chassis			
60	R–41430a	Printed wiring board	1
61	R–S81082	┬Hinge complete	1
	R–112428	├Hinge metal	1
	R–112424	├Hinge metal	1
		├Stopper	1
		└Washer	1
62	R–S81083	┬Hinge complete	1
	R–112428	├Hinge metal	1
	R–112424	├Hinge metal	1
		├Stopper	1
		└Washer	1
63	R–112429	Mounting metal	1
64	R–112425	Mounting metal	1
65	R–241040	Spacer	1
66	R–S81081	┬Mounting metal complete	1
	R–24796b	├Shaft	1
	R–112423	└Mounting metal	1
67	R–112427	Mounting metal	2
68	R–39244	Knob	2
69	R–47938	Indication board	2
	R–12273	Coil spring	2
	R–112430	Fin	1
70	R–112421	Mounting metal	1
71	R–112440	Mounting metal	1
72	R–36188	Panel-for DC,AC select switch	1
73	R–32509	Mounting base	1
74	R–112440	Lever	1
	R–39252	Base	1
	R–25144	Terminal plate	10
	R–15141	Pin	3
	R–13051b	Plate spring	3
75	R–12285	Coil spring	1
76	R–12286	Coil spring	1
77	R–241039	Spacer	1
78	R–241038	Bar	1
79	R–112426	Chassls	1
80	R–32514	Mounting base	2
81	R–23773	Terminal plate	2
82	R–25253	Coil spring	2
	R–41277a	Patch	2
83	R–25257	Mounting metal	1
	R–112493	Mounting metal	1
	R–36187	Panel-for AC,DC select switch	1
84	R–112551	Mounting Metal	1
85	R–47003	Battery cover paper	1
86	R–112582	Stopper	1
87	R–35216	Ribbon	1

MECHANISM

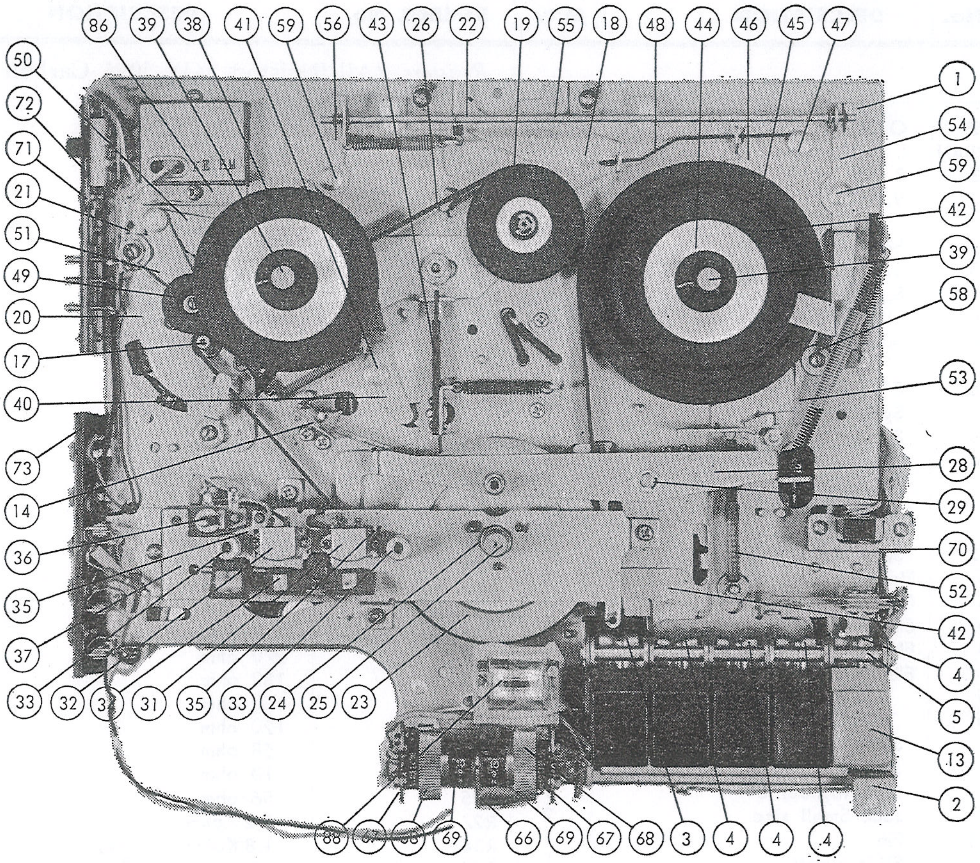
ILLUST No.	STOCK No.	DFSCRIPTION	Q'ty
Chassis, Push Button			
1	R-112433a	Chassis	1
2	R-112524	Mounting Metal–push button stopper	1
3	R-112525	Lever–push button stop lever	1
4	R-112526	Lever–push button lever	4
5	R-14174	Shaft–push buston shaft	1
6	R-112527	Lever–push button stop	1
7	R-241061	Shaft–stop lever	1
8	R-112528	Lever–mis–operation proof	1
9	R-14175	Bar–pinch lever	1
10	R-S81135	Lever complete–record switch	1
	R-112529	–Lever	1
	R-112530	–Lever	1
	R-24916	–Spacer	1
11	R-241062	Shaft–record lever	1
12	R-241063	Spacer–mis–operation proof Lever	1
13	R-39243	Button–push button	5
		Washer	1
14	R-S4312	Spring switch	1
15	R-S4313	Spring Switch	1
Motor, Flywheel			
16	R-S5110	DC motor	1
	R-241047	Pulley–motor pulley	
17	R-241048	Pulley–motor pulley	1
	R-241049	Pulley–motor pulley	
		Construction diagram–roller etc.	
18	R-S81139	Lever complete	1
	R-112545	–Lever–motor slide	1
	R-14179	–Shaft–roller shaft	1
19	R-34146	Roller	1
		Felt	1
		Washer	2
20	R-112540	Slide–motor slide	1
21	R-241050	Spacer–motor slide	1
22	R-112759	Mounting metal	3
23	R-S81140	Flywheel complete	1
	R-28115	–Flywheel	1
	R-12289	–Shaft	1
24	R-S81141	Capstan complete	1
	R-241051	–Sleeve	1
	R-241052	–Special screw	1
25	R-22037	Shaft bearing–flywheel	1
	R-112541	Mounting metal	1
26	R-44252	Flat belt	1
Pinch roller (Construction diagram–pinch roller)			
	R-44255	Pinch roller	1
	R-241068	–Shaft bearing	1
28	R-S81138	Lever complete–pinch lever	1
	R-112523	–Lever	1
	R-241055	–Spacer	1
	R-14177	–Shaft	1
	R-241056	–Shaft bearing	1
29	R-14178	Shaft–pinch lever	1
	R-24828a	Special screw–pinch roller fix	1
Head (Construction diagram–head)			
31	R-S6328	Record/Play back playback head	1
32	R-S6357	Erase head	1
33	R-241044	Guide–tape guide	2
34	R-S81144	Pad complete	1
		–Felt–guide pad	1
	R-43138	–Felt	2
	R-25220	–Plate spring	1
	R-29010	–Hinge	1
	R-112544	–Hinge	1
	R-12290	–Bar	1
	R-23790	–Hinge–quide pad	1
	R-12222	–Coil spring–pad press	2
	R-23791	–Mounting metal	1
	R-23792	–Mounting metal	1
	R-24825	–Rivet	4
35	R-25221	Plate spring	2
36	R-S81145	Spring switch complete –capstan–rest switch	1
	R-24145	–Insulation panel	1
	R-241045	–Shaft	1
	R-25258	–Plate spring	1
	R-S3063	–Lug	1
		–Hex. nut	1
		–Spring washer	1
		–Bolt nut washer	2
		–Stopper ring	1
37	R-112546	Mounting metal–head	1
Feed Ree base, Takeup reel base (Construction diagram–takeup reel)			
38	R-S81136	Reel base complete	2
	R-34147	–Reel base	2
	R-12288	–Special spring	2
39	R-241057	Special screw	2
	R-S81137	Shaft complete	1
	R-14176	–Shaft	1
	R-241058	–Ring	1
	R-112531	–Mounting metal	1
40	R-112532	Lever–back tension lever	1
		Felt–back tension	1
41	R-24763a	Spacer back tension lever	1
42	R-112533	Lever–rewind lever	1
	R-24916	Spacer–rewind lever	1
43	R-13083	Plate spring	1
44	R-261264	Mounting Metal	2
		Construction diagram–takeup reel	
	R-14181	Shaft–takeup reel	1
	R-241059	Ring–reel shaft base	1
	R-241060	Ring–reel shaft lift	1
45	R-34148	Pulley–reel base pulley	1
	R-44253	–Roller	1
		Feet–slip felt	1
	R-25259	Plate spring–fast forward	1
46	R-112534	Slide–fast lorward plate spring	1
47	R-241050	Spacer–fast forward press spring	1
48	R-15222	Spring	1
Idler (Construction diagram–idler)			
49	R-S81142	Idler complete	1
	R-34149	–Frame–idler frame	1
		–Tyre–frame	1
50	R-S81143	Lever complete–idler lever	1
	R-14180	–Shaft–idler shaft	1
	R-112542	–Lever	1
	R-112543	–Lever	1
	R-24916	–Spacer	1
	R-241046	Spacer	1
51	R-241208	Mounting metal	1
Brake			
52	R-112536	Slide–brake slide	1
53	R-112537	Lever–takeup reel base brake	1
54	R-112538	Lever	1
55	R-241053	Bar	1
56	R-112539	Lever	1
		Leather–brake	2
57	R-241054	Spacer–brake slide	2
58	R-241063	Spacer–brake lever	1
59	R-24763a	Spacer–brake lever	2

AMPLIFIER CHASSIS

ILLUST No.	STOCK No.	DESCRIPTION	Q'ty
Electric Parts			
	R-W6269	O. P. T.	1
	R-W6240b01	I. P. T.	1
	R-W7093	P. T.	1
	R-R11644	V. R.	1
	R-11636	V. R.	1
	R-11010	Semi fixed V. R.	1
	R-R11013	Semi fixed V. R.	1
	R-S6354	Speaker	1
	R-W8107	OSC coil	1
	R-S6314a	Microphone	1
	R-S8347a	5″ tape	1
	R-32143a	5″ reel	1
		Splicing tape	1
	R-S8677a	—Schield wire complete	1
	R-S1177a	—Plug	2
	R-44001	—Rubber ring	1
88		—Schield wire	1
	R-S5531	Meter	1
	R-R11012	Semi fixed V. R.	1
	R-C9155	Electrolytic capacitor 500µF 25V	1
	R-C9144	Electrolytic capacitor 500µF 3V	3
	R-C9146	Electrolytic capacitor 10µF 10V	1
	R-C9133	Electrolytic capacitor 30µF 3V	4
	R-C9131	Electrolytic capacitor 5µF 6V	8
	R-C9075	〃 0.1µF 25V solid	1
	R-C9135	〃 500µF 15V	3
	R-S4311	Slide switch	1
	R-S2123	Jack-middle size	2
	R-S2124	Jack-without SW	1
	R-S2112	Jack-Small size	2
	R-261193	Fin	1
	R-S4266	Slide switch	1
	R-S1260	Fuse 0.5A	1
	R-S3007	Lug plate	1
	R-S3165	Lug	5
	R-S3008	Lug	6
	R-24638	Cord stopper	1
	R-S4315	Rotary Switch	1
		Fuse folder	2
	R-S3163	AC cord complete −250V, 6A	1
	R-S8574b	Adaptor complete −S 2P	1
	R-S8575b	Adaptor complete −E 2P	1
	R-S3169	Tetminal	1
		—3 wire cord	1
	R-S1076a	—Plug −E 3P	1
		—Cushion	1
	R-S2142	—Connector	1
	R-S3168	Terminal−3pin	1
	R-S8694	Adaptor complete-Aus. 3-pin	1
		Diode IS188 or IN60	2
	R-S1234	Silicorn rectifier	2
	R-S1251	Diode RD−9A	1
	R-S1182	Varistor SV-30	1
		Thermistor SDT−06	1
		Transistor 2SB303C	1
		Transistor 2SB186	2
		Transistor 2SB186	1
		Transistor 2SB272	2
		Transistor 2SB187	1
		Transistor 2SB217	1

SYMBOL No.	DESCRIPTION	Q'ty
Resistors	(All Resistors ¼W, 10%, Carbon p type unless otherwise noted)	
R47, R49	470 Kohm	2
R32	390 Kohm	1
R40	330 Kohm	1
R38	150 Kohm	1
R41	100 Kohm	1
R39	82 Kohm	1
R1,2, R13, R14	27 Kohm	3
R5 R6	15 Kohm	2
R30	12 Kahm	1
R15, R24	10 Kohm	2
R4	8.2 Kohm	1
R3	6.8 Kohm	1
R16, R29, R19, R7	5.6 Kohm	4
R8, R23	3.9 Kohm	2
RI8, R11	3.3 Kohm	2
R2, R21, R25, R26	1.8 Kohm	4
R9, R54	1 Kohm	2
R33	820 ohm	1
R20, R53	560 ohm	2
R31, R17	390 ohm	2
R22, R37, R50	330 ohm	3
R44	270 ohm	1
R43	180 ohm	1
R51	150 ohm	1
R52, R28	120 ohm	2
R10, R35	68 ohm	2
R1	10 ohm	1
R55	56 ohm	1
R27	1.2 Kohm	1
R34	1.8 Kohm 5%	1
R45	27 ohm 5%	1
R42	10 ohm 5%	1
R36	2.2 ohm 5%	1
R46	22 ohm	1
R48	8.2 ohm ½W	1
Capacitors		
C14	Mylar, Square Type 0.1 Fµ + 30, −20% 25—50WV	1
C8, C29	Mylar, Square Type 0.082 Fµ +10, −10% 25—50WV	2
C22, C23	Mylar, Square Type 0.005 Fµ +30, −20% 25—50WV	2
C31	Mylar, Square Type 0.004 Fµ +10, −10% 25—50WV	1
C30, C35	Mylar Square Type 0.001 Fµ +10, −10% 25—50WV	2
C21	Mylar, Square or Tubular Type 250 pF +20, −20% 25—125WV	1
C27	Mylar, Square or Tubular Type 150 pF +10, −10% 25—125WV	1
C20	Mylar Square Type 80 pF +20, −20% 10—125WV	1
C9	Mylar, Square Type 0.01 Fµ +30 −20% 25—50WV	1

ILLUSTS FOR PARTS LIST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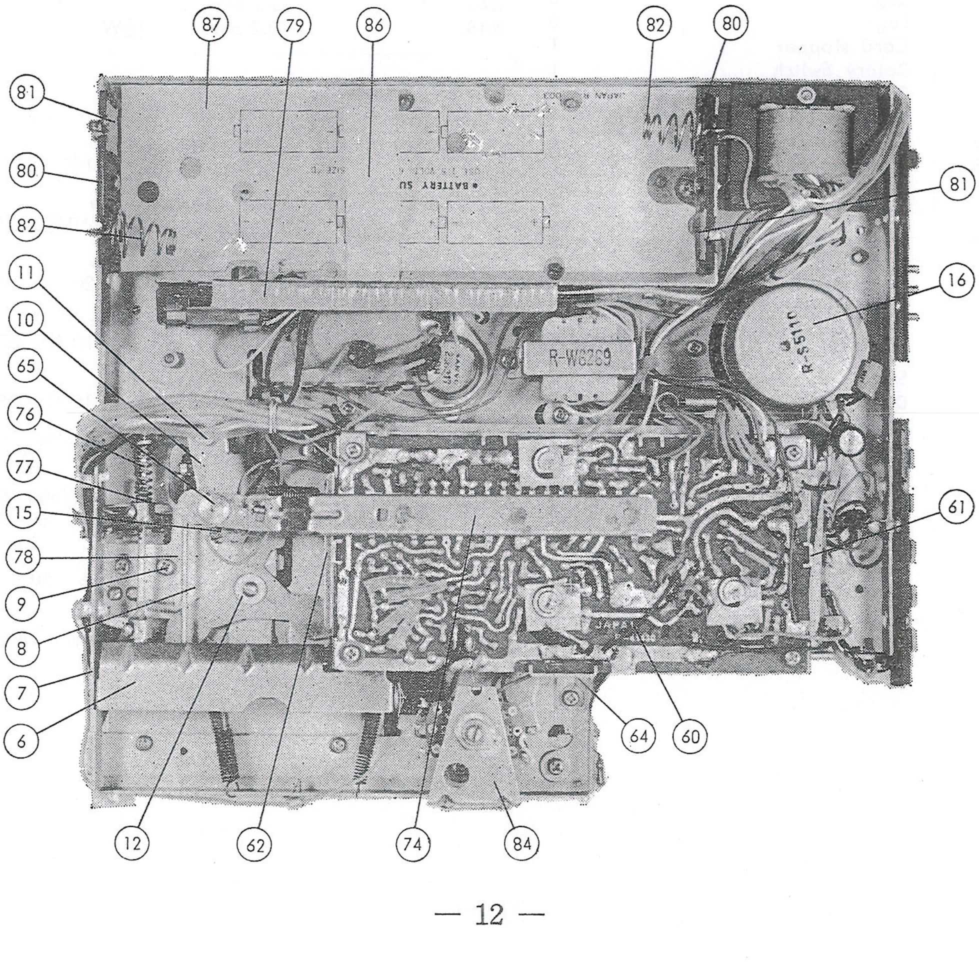
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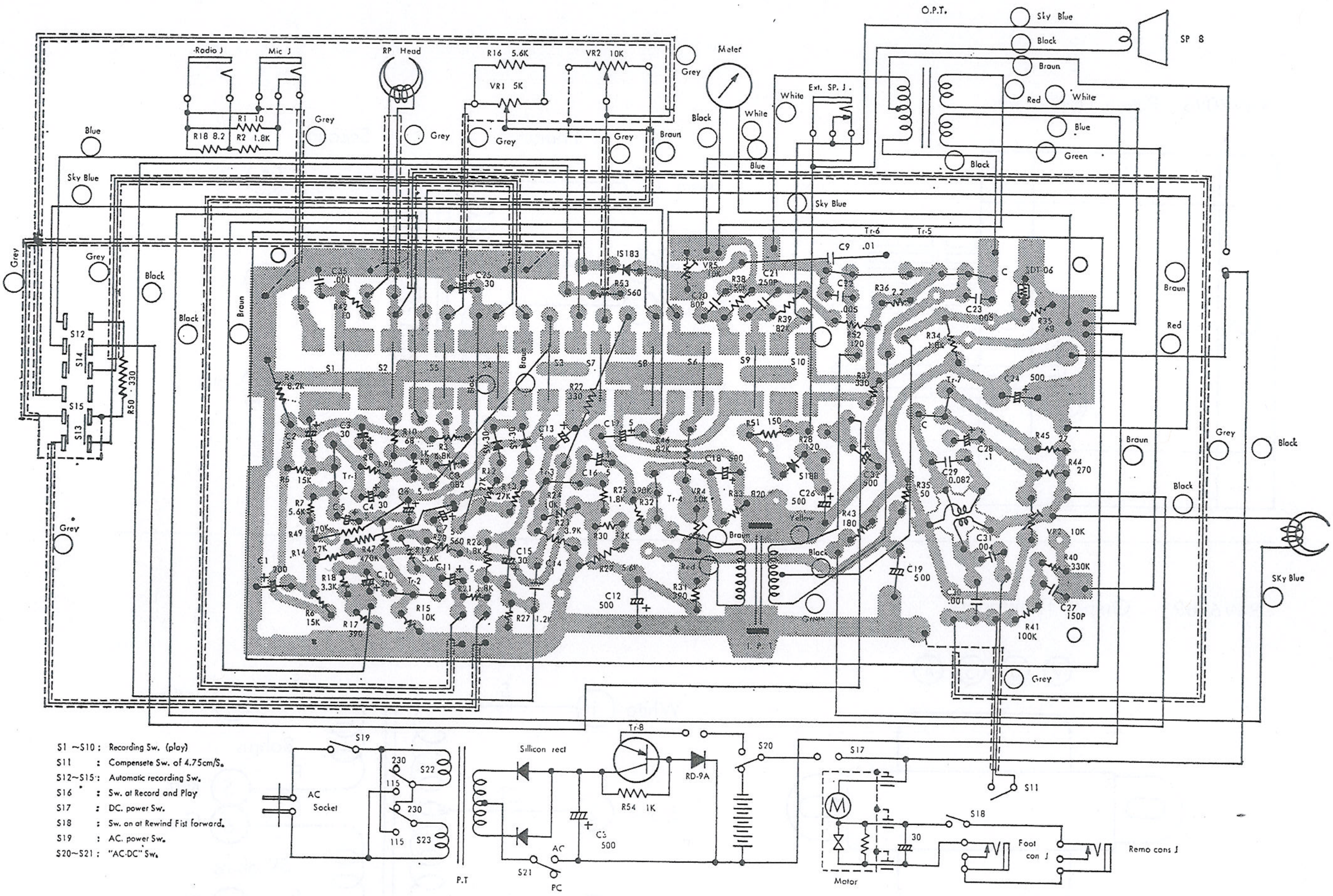
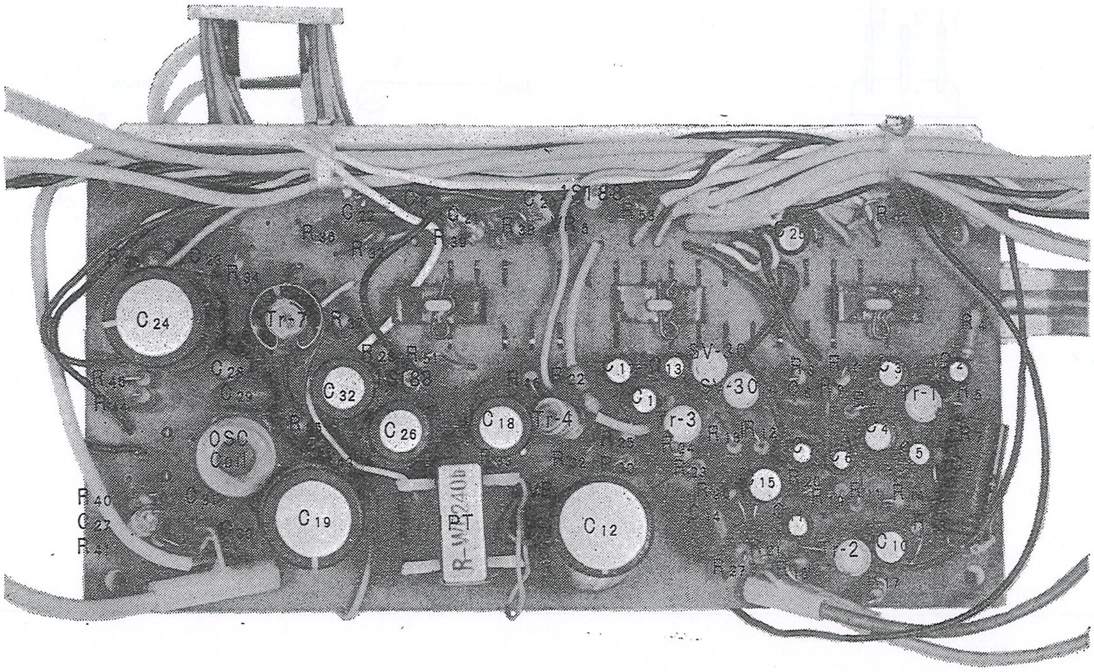
BATTERY SU
R-W6289
R-S110

INNER-PARTS CONNECTION


O.P.T.
Sky Blue
Black
Braun
Red
White
Blue
Green
SP 8
Radio J
Mic J
RP Head
R16 5.6K
VR2 10K
VR1 5K
Meter
Grey
White
Ext. SP. J.
R1 10
R18 8.2
R2 1.8K
Tr-6
Tr-5
C9 .01
1S183
VR5
R53 560
C21 250P
C22
R36 2.2
C23 .005
R38 50K
R39 82K
R52 120
R34
R35 68
C24 500
S1
S2
S3
S4
S5
S6
S7
S8
S9
S10
S12
S13
S14
S15
R50 330
Tr-1
Tr-2
Tr-3
Tr-4
Tr-7
C1 200
C2
C3 30
C4 30
C5
C10
C11 5
C12 500
C13
C14
C15 30
C16 5
C17 5
C18 500
C19 500
C20 50P
C25 30
C26 500
C27 150P
C28 .1
C29 0.082
C30 .001
C31 .004
C32 500
C33 .005
R3 1.8K
R4 8.2K
R5 15K
R6 15K
R7 5.6K
R15 10K
R17 390
R18 3.3K
R22 330
R25 390K
R27 1.2K
R31 390
R33 820
R37 390
R40 330K
R41 100K
R43 180
R44 270
R45 27
R49
R51 150
R28 120
VR3 10K
VR4 50K
1S188
Yellow
I.P.T
S19
230
115
S22
S23
AC Socket
P.T
Silicon rect
Tr-8
R54 1K
RD-9A
C5 500
AC
PC
S21
S20
S17
S11
S18
Motor
M
30
Foot con J
Remo cons J

S1 ~S10 : Recording Sw. (play)
S11 : Compensete Sw. of 4.75cm/S.
S12~S15 : Automatic recording Sw.
S16 : Sw. at Record and Play
S17 : DC. power Sw.
S18 : Sw. on at Rewind Fist forward.
S19 : AC. power Sw.
S20~S21 : "AC·DC" Sw.

MAIN PARTS LOCATION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Tr-7
C32
C26
C18
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OSC Coil
C19
PT
R-WP240b
C12
R40
C27
R41
1S188
C25
R36
R34
C23
R45
R44
C28
C29
R35
R53
R38
R39
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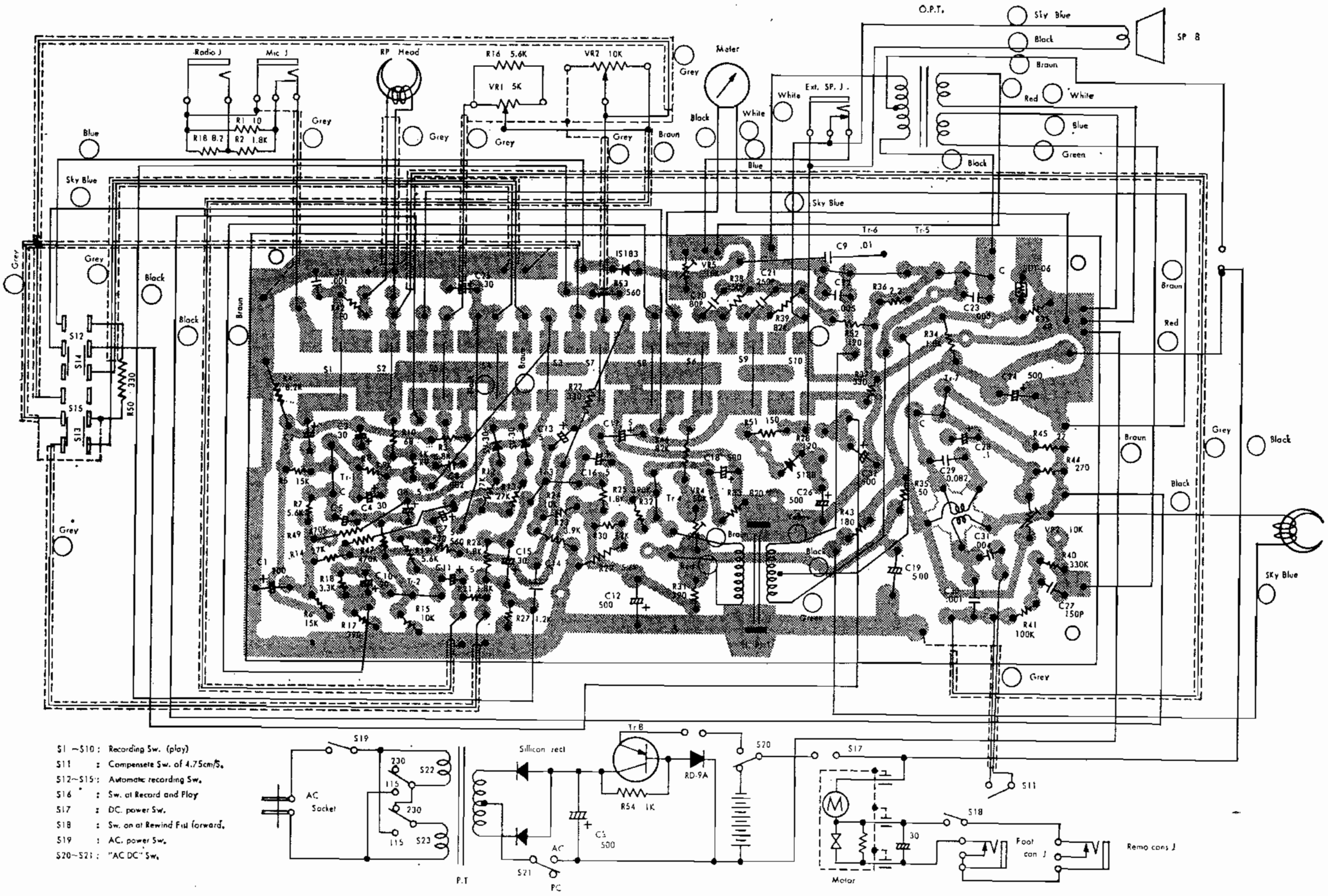
C10
R27
C13
C11

INNER-PARTS CONNECTION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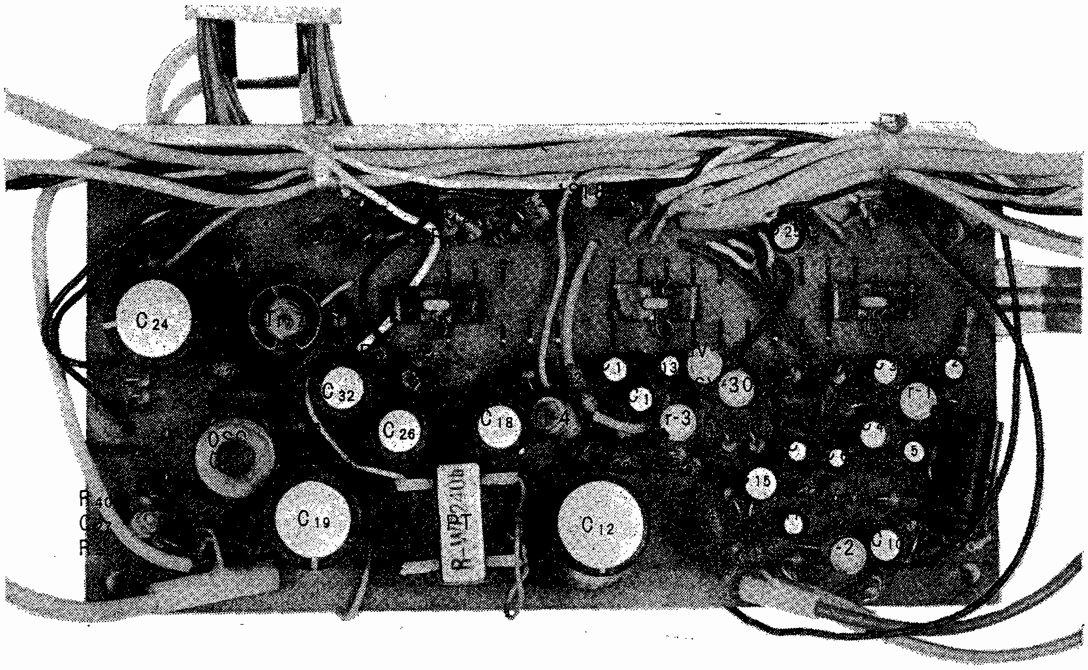
Sky Blue
Black
Braun
Red
White
Blue
Green
SP 8
Radio J
Mic J
RP Head
R16 5.6K
VR2 10K
VR1 5K
Meter
Ext. SP. J.
R1 10
R18 8.2
R2 1.8K
Grey
Blue
Sky Blue
Black
White
Braun
Tr-6
Tr-5
C9 .01
1S183
R53 560
S12
S14
S15
S13
R50 330
S1
S2
S3
S7
S8
S6
S9
S10
R45 27
R44 270
C27 150P
R41 100K
R40 330K
C12 500
C19 500
S19
230
S22
115
S23
AC Socket
P.T
Silicon rect
Tr-8
RD-9A
R54 1K
C5 500
S20
S21
AC
DC
S17
S11
S18
Motor
30
Foot con J
Remo cons J

S1 ~S10 : Recording Sw. (play)
S11 : Compensete Sw. of 4.75cm/S.
S12~S15 : Automatic recording Sw.
S16 : Sw. at Record and Play
S17 : DC. power Sw.
S18 : Sw. on at Rewind Full forward.
S19 : AC. power Sw.
S20~S21 : "AC DC" Sw.

MAIN PARTS LOCATION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C32
C26
C18
C19
C12
R-WP240B
15
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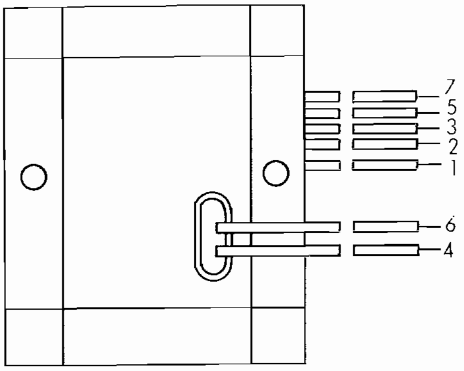
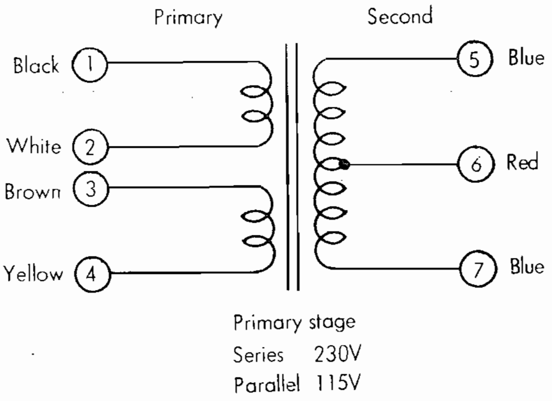
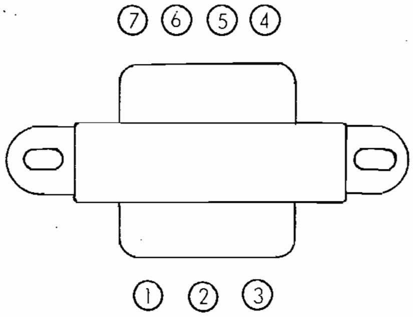
MAIN PARTS CONNECTION

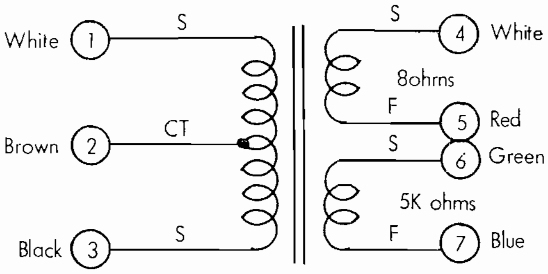
R-W7093 Power Transformer



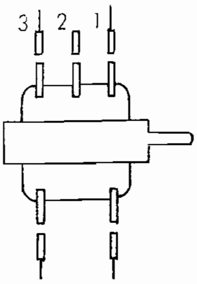

Primary
Second
Black 1
White 2
Brown 3
Yellow 4
5 Blue
6 Red
7 Blue
Primary stage
Series 230V
Parallel 115V

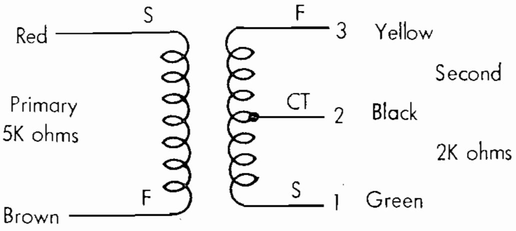
R-W6269 Output Transformer



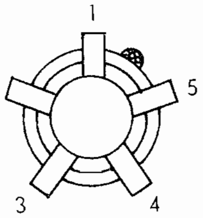

White 1
S
Brown 2
CT
Black 3
S
S
4 White
8ohms
F
5 Red
S
6 Green
5K ohms
F
7 Blue

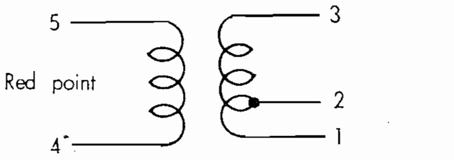
R-W6240b Input Transfomer




Red
S
Primary
5K ohms
Brown
F
F
3 Yellow
Second
CT
2 Black
2K ohms
S
1 Green

R-W8107 Osallator Coil




5
Red point
4
3
2
1

Oscillating Frequency 50K C/S 25%